

HARBORVIEW MEDICAL CENTER

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January 14, 1972

Professor Joshua Lederberg
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Stanford University
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Dear Doctor Lederberg:

Your note of November 19th was very welcome. I have been tardy in responding to it because of the pressure of other obligations. Let me now answer your questions as straightforwardly as I can.

Question 1: Are there other studies in cost effectiveness in radiology?

Very few which explicitly identify dollar costs of case findings. I have seen an unpublished report by P. Strax and others, of New York, where it was estimated that otherwise unsuspected breast carcinomas cost nearly \$10,000 each to detect on mammograms with an improved likelihood of cure in the positive group and reassurance in the negative group. The reassurance was not total since some unsuspected carcinomas were overlooked radiographically. Similar studies are likely to have been published without having come to my attention.

A review of Davies' (Journal of Chronic Diseases:819 August, 1966), reviews earlier reports including that by Guiss where nearly two million persons over fifteen years of age had chest photofluorographs in Los Angeles County yielding two hundred forty-four lesions which eventually proved to be cancer. Most of these were unresectable but among seventy patients who survived operation for cure, twenty-one were judged free of disease five years later. Three-quarters of these had been asymptomatic when their cancers were detected while the symptomatic group had a lower rate of both resectability and cure. The direct and indirect cost of radiating nearly two million thus benefits a sum of twenty-one cured.

Chest photofluorography for tuberculosis is no longer judged to be cost effective by the American Tuberculosis and Respiratory Disease Association who recommend that the practice be discontinued. You may have noticed discussion of some of the implications of this recommendation in a recent issue of Science.

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Question 2: Is it worth \$5,000 to find a skull fracture not otherwise detected? Will this never influence therapeutic response?

Therapeutic response includes surgery and antibiotics. These pertain to a small minority of patients with skull fractures and are of uncertain benefit. Antibiotics may do as much harm as good in compound skull fracture (MacGee, and others, Journal of Neurosurgery; 33:312, 1970). Elevation of a depressed fracture fragment may not avert postoperative epilepsy and in any case would be hard to justify where there was no clinical evidence for acute brain damage.

I can conceive a situation where a head injured patient has improper initial evaluation; we cite three such anecdotes in the paper. Even in these cases the demonstration of fracture did not benefit the patient. The treatment was unchanged in all cases. The real beneficiary from skull radiography is the physician who feels more secure, not in his medical decision, but in his invulnerability to a later accusation of negligence. It is irrelevant that his decisions are medically sound, or even that he can eventually win his case. The point is that the magic of x-ray is so firmly fixed in the minds of patients and their lawyers that the physician has to hedge against the threat of harassment by (possibly) well intended but misinformed lay people. This kind of "defensive medicine" is gradually creating an atmosphere where more and more unnecessary, poorly indicated, and useless radiography is carried out.

Question 3: How many genetically and cancer significant rems are involved (in skull examinations for trauma)?

Some years ago we estimated that approximately 280 millirem were delivered to the skin in a routine five-film skull examination in our department. The genetic exposure in this examination was measured at one-tenth of a millirem. Applying the reasoning which you have suggested, I conclude that the gene mutation cost is small in these instances while the cancer cost or perhaps the cataract cost is significant as an indirect cost though smaller than the dollar cost to the patient. Stated another way, it seems to me that skull examination where indicated to diagnose a complication of skull fracture, is still a good buy at even twice its present price and I would accept it where the ratio of positives to negatives among suspects was in order of tens or scores, but probably not where it was hundreds or thousands.

I was interested to learn that genetic mutation could possibly be attributed to ionizing background radiation in as many as 10 percent of instances. I read a much lower figure in the past when I was thinking about how to design an experiment to assess the biological effects of this background using the average longevity of mice as a

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measuring stick. It had seemed to me that it would be possible to create an artificial environment by shielding and refinement of alimnts to reduce background radiation several fold. In such an environment of minimal background radiation increments of improved health andlongivity might be evident in these animals.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "John W. Loop".

John W. Loop, M.D.
Radiologist-in-Chief

JWL/db
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